

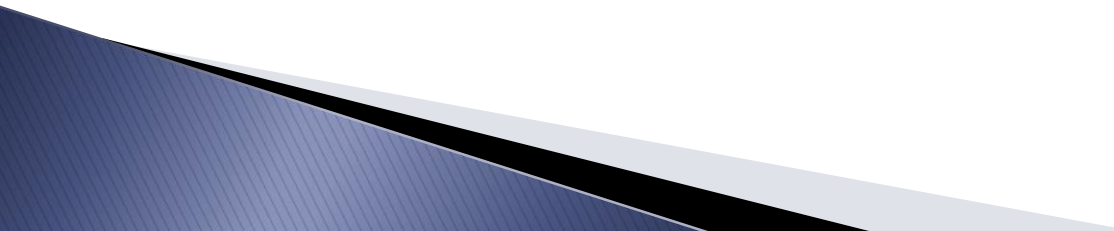
# Preventing Nonventilator Hospital–Acquired Pneumonia: Back to Basics

APIC, November 5, 2015

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HAPPI 2015 Study, Co–Principle Investigator

Disclosure:  
Sage Research Grant  
Sage Honoraria

# Objectives:

1. Significance of non-ventilator associated hospital-acquired pneumonia (NV-HAP)
  2. Pathophysiology of pneumonia and what healthcare workers can do to prevent it
  3. Culture-changing strategies to advance basic patient care and improve patient outcomes
- 

- ▶ *“The very first requirement in a hospital is that it should do the sick no harm.”*

- *Florence Nightingale*



- **Vision:** Healthcare without infection
- **Mission:** Create a safer world through prevention of infection (APIC)

ORIGINAL ARTICLE

## Multistate Point-Prevalence Survey of Health Care–Associated Infections

### ► Purpose:

- Estimate total # of health care–associated infections in U.S. acute care hospitals, 2011

### ► Method:

- National Healthcare Safety Network (NHSN) criteria
- One-day surveys, randomly selected inpatients
- 183 hospitals, 11,282 patients

# Impact of Hospital Acquired Infections

- ▶ 1 in 25 patients
- ▶ 722,000 infections
- ▶ 75,000 deaths
- ▶ > ½ outside ICU
- ▶ 25.6% of all HAI = CLABSI, CAUTI & VAP
- ▶ **CDC recommendation:**
  - ▶ Expand surveillance and prevention activities on non-device related infections

Major Site of Infection	Estimated No.
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<b>Pneumonia</b>	<b>157,500</b>
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Gastrointestinal Illness	123,100
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Urinary Tract Infections	93,300
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Primary Bloodstream Infections	71,900
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Surgical site infections from any inpatient surgery	157,500
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Other types of infections	118,500
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**Estimated total number of infections 721,800 in hospitals**

# Significance of Hospital-acquired Pneumonia

- ▶ New #1 HAI in U.S.
- ▶ Mortality
- ▶ Cost
- ▶ Length of stay
- ▶ 30-Day Readmission

Kollef, M.H. et.al. (2005). *Chest*. 128, 3854–3862.  
ATS, (2005). *AmJ Respir Crit Care Med*. 171, 388–416.  
Lynch (2001) *Chest*. 119, 373S–384S.  
Pennsylvania Dept. of Public Health (2010).

# Definition:

## Hospital-Acquired Pneumonia

- ▶ Hospital-acquired pneumonia (HAP)
  - 48 hours
  - Meets algorithm of criteria (CDC, 2003)
- ▶ Types of Pneumonia
  - Community-acquired
  - Healthcare-associated
  - VAP
  - **NV-HAP**

ATS (2005)  
CDC (2003)



# Significance of NV-HAP

- ▶ Non-device related
- ▶ NV-HAP > VAP

Table 1. Pennsylvania Nosocomial Pneumonia and Related Deaths

YEAR	NO. OF NV-HAP CASES	NO. OF NV-HAP DEATHS	% OF NV-HAP CASES CONTRIBUTING TO DEATH	NO. OF VAP CASES	NO. OF VAP DEATHS	% OF VAP CASES CONTRIBUTING TO DEATH
2009	1,976	363	18.4 (95% CI: 16.5 to 20.3)	922	163	17.7 (95% CI: 15.0 to 20.5)
2010	1,848	366	19.8 (95% CI: 17.8 to 21.8)	737	144	19.5 (95% CI: 16.3 to 22.7)
2011	1,773	315	17.8 (95% CI: 15.8 to 19.7)	640	127	19.8 (95% CI: 16.4 to 23.3)
<b>Total</b>	<b>5,597</b>	<b>1,044</b>	<b>18.7 (95% CI: 17.5 to 19.8)</b>	<b>2,299</b>	<b>434</b>	<b>18.9 (95% CI: 17.1 to 20.7)</b>

Note: NV-HAP refers to non-ventilator hospital-acquired pneumonia and VAP refers to ventilator-associated pneumonia.



# Incidence of NV-HAP: Our Study

550 bed, urban, tertiary care hospital  
2010 retrospective review, Adults  
24,482, patients; 94,247 patient days

## Inclusion criteria:

Age >17

ICD-9 pneumonia, not present on admission

Met CDC criteria for HAP

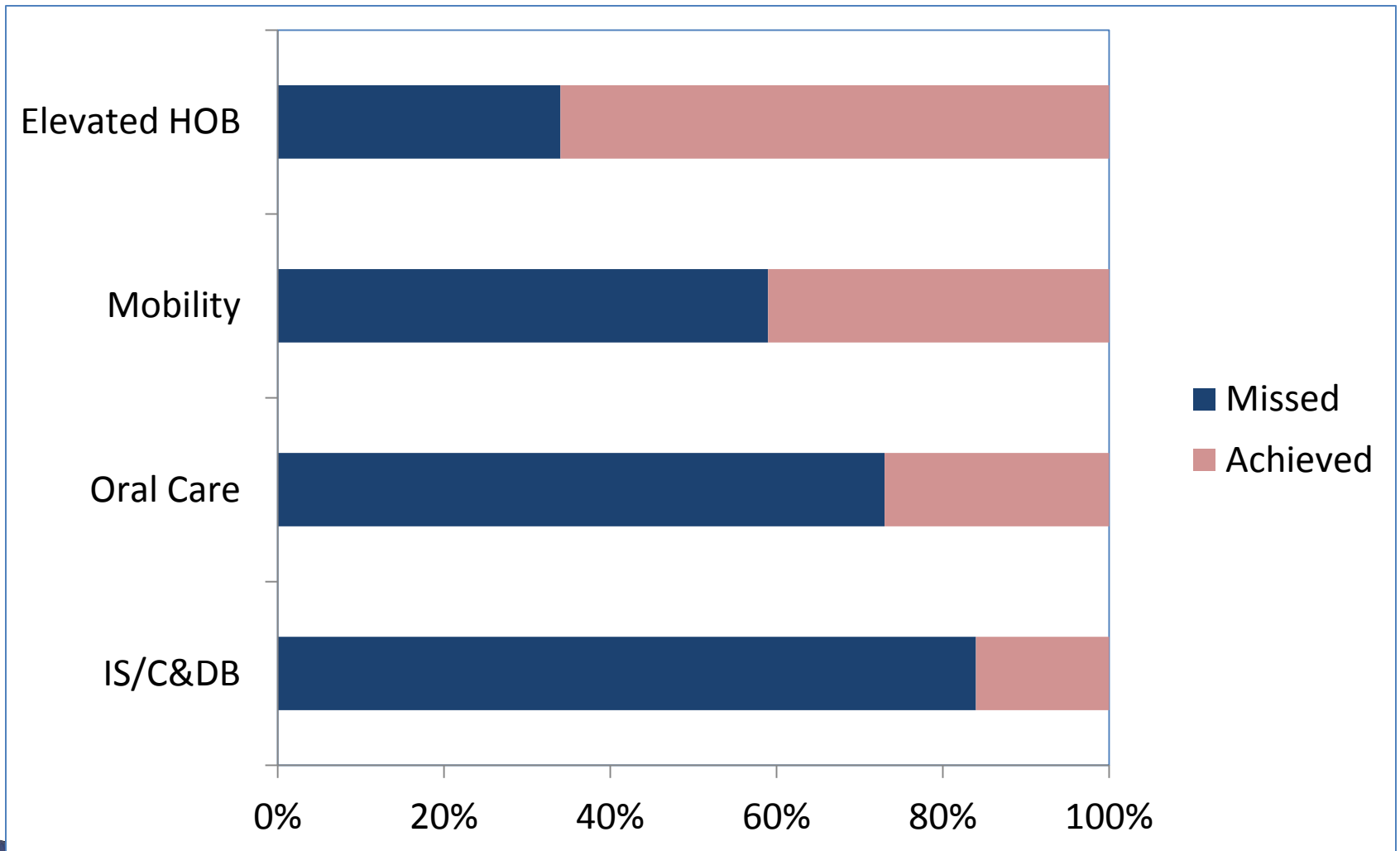
# Results

- ▶ 115 cases of NV-HAP (adults)
  - 35 ICU
  - 80 Med/Surg, Ortho, Tele, Onc, Neuro
  - **ALL Units affected**
- ▶ Total estimated annual effect of NV-HAP:
  - \$4.6 million
  - 23 deaths
  - 1035 days



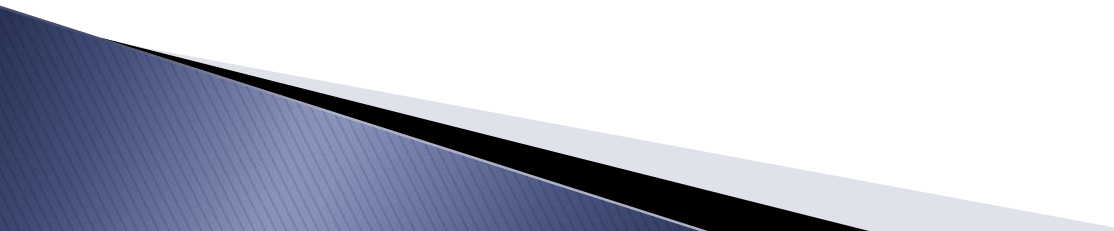
Quinn, B., Baker, D., et. al. (2013). Basic nursing care to prevent nonventilator hospital-acquired pneumonia. *Journal of Nursing Scholarship*.

# Missed Nursing Care\*

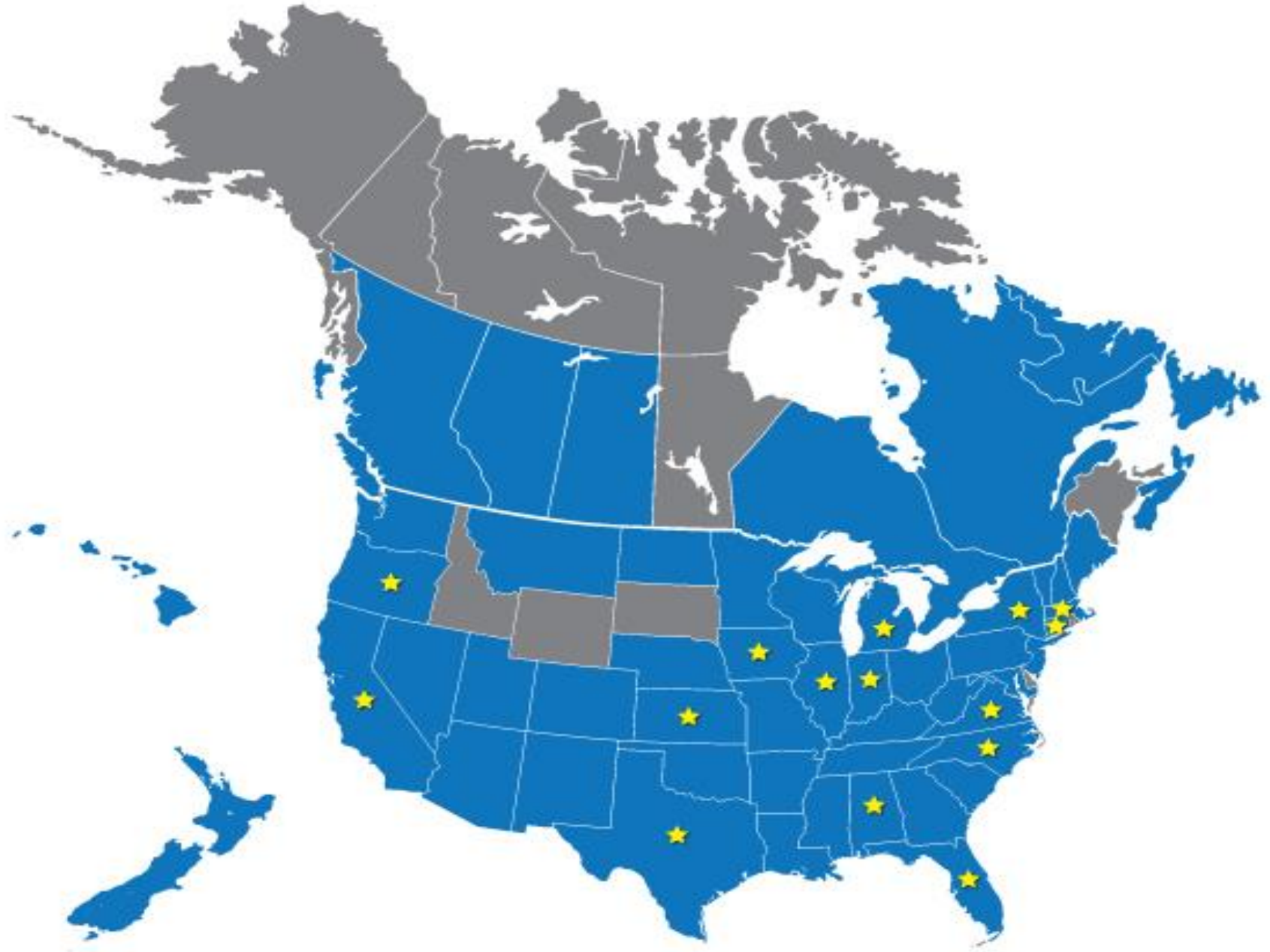


\*Kalisch, B. (2013). Am Journ Med Qual.  
Missed nursing care leads to poor pt outcomes.

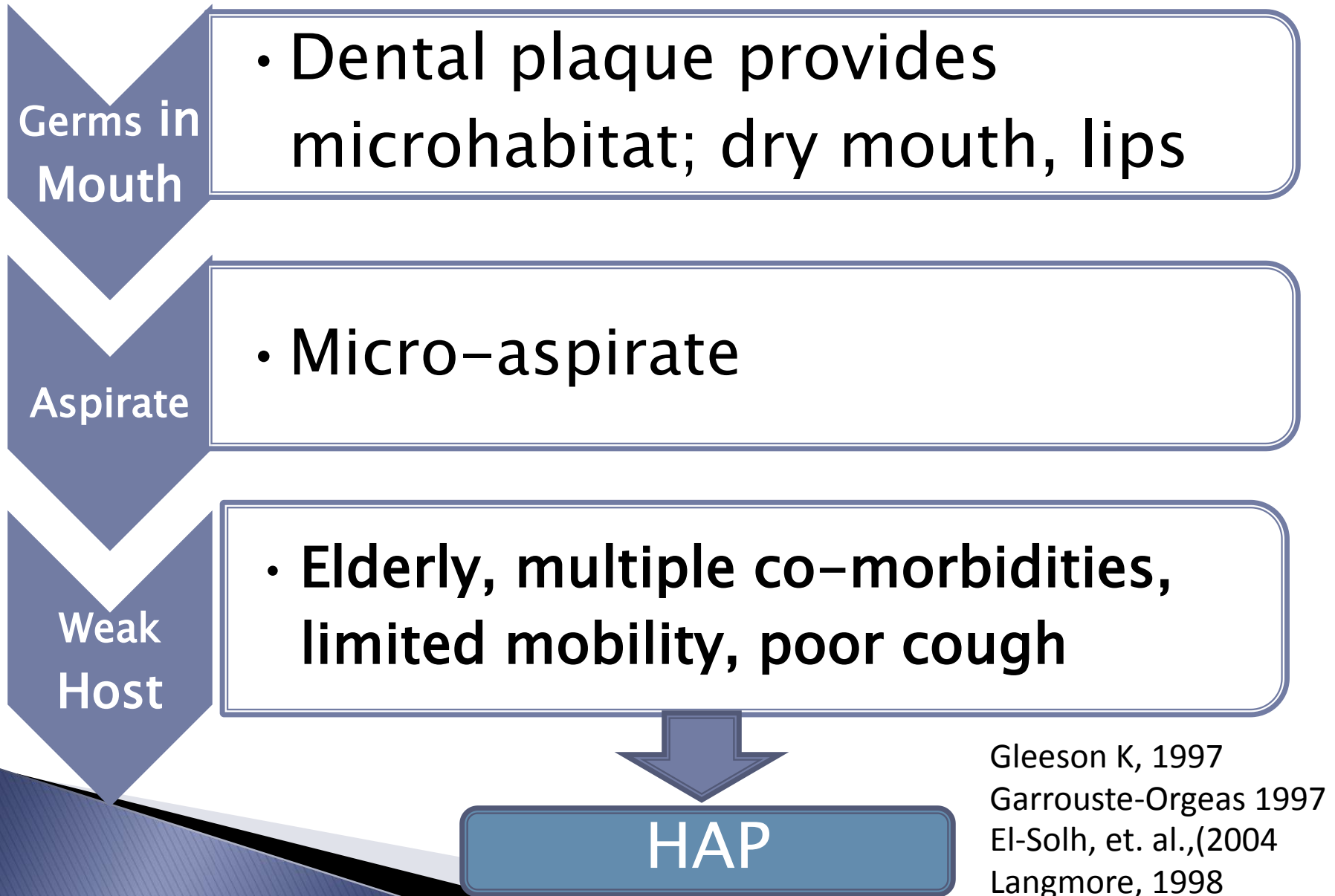
# NV-HAP Conclusions

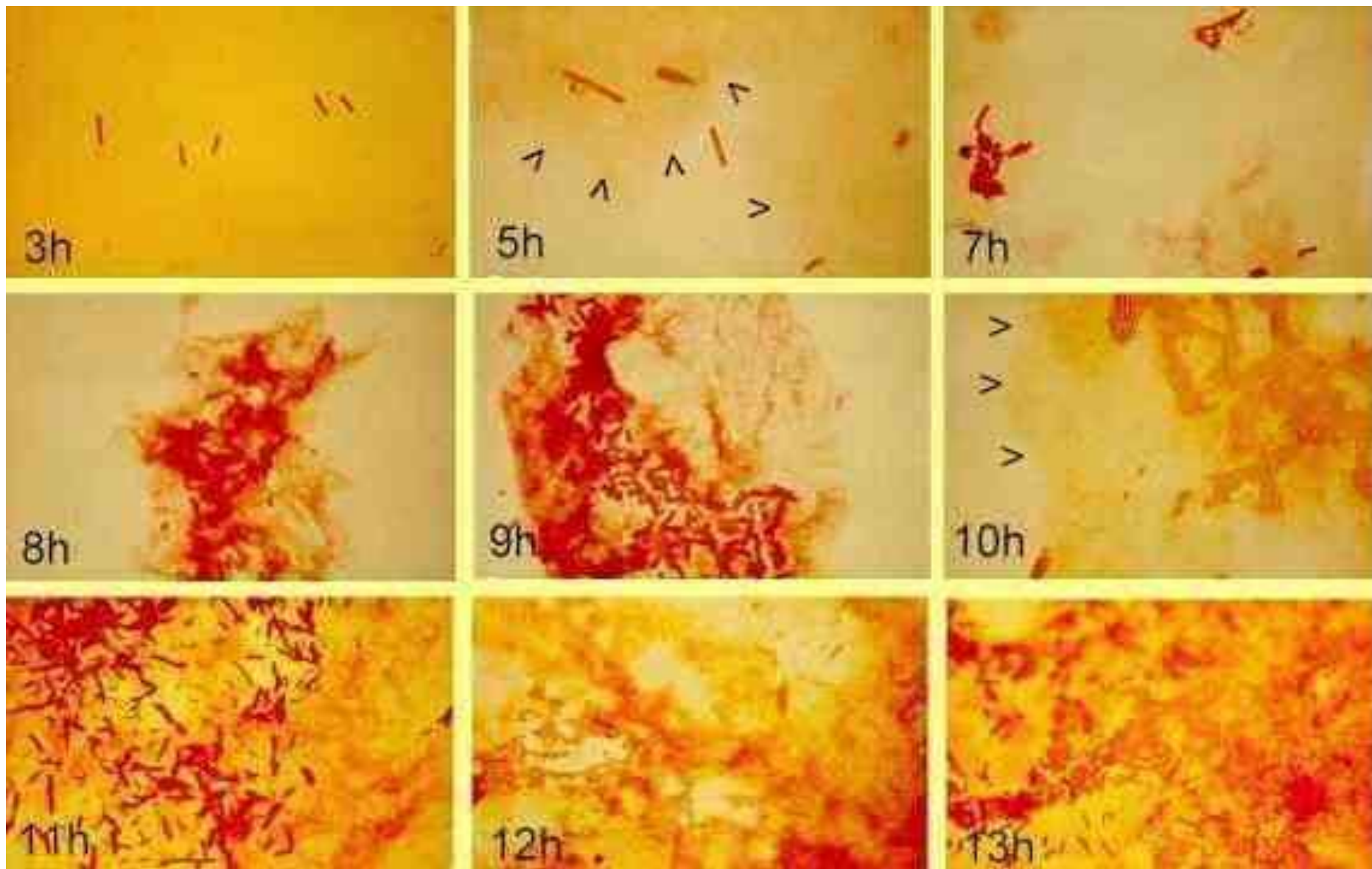
- ▶ NV-HAP is occurring in greater number than VAP
  - ▶ Costing lives and dollars
  - ▶ Patients are at risk on **ALL** units
  - ▶ Preventive nursing care is being missed
- 





# Pathogenesis



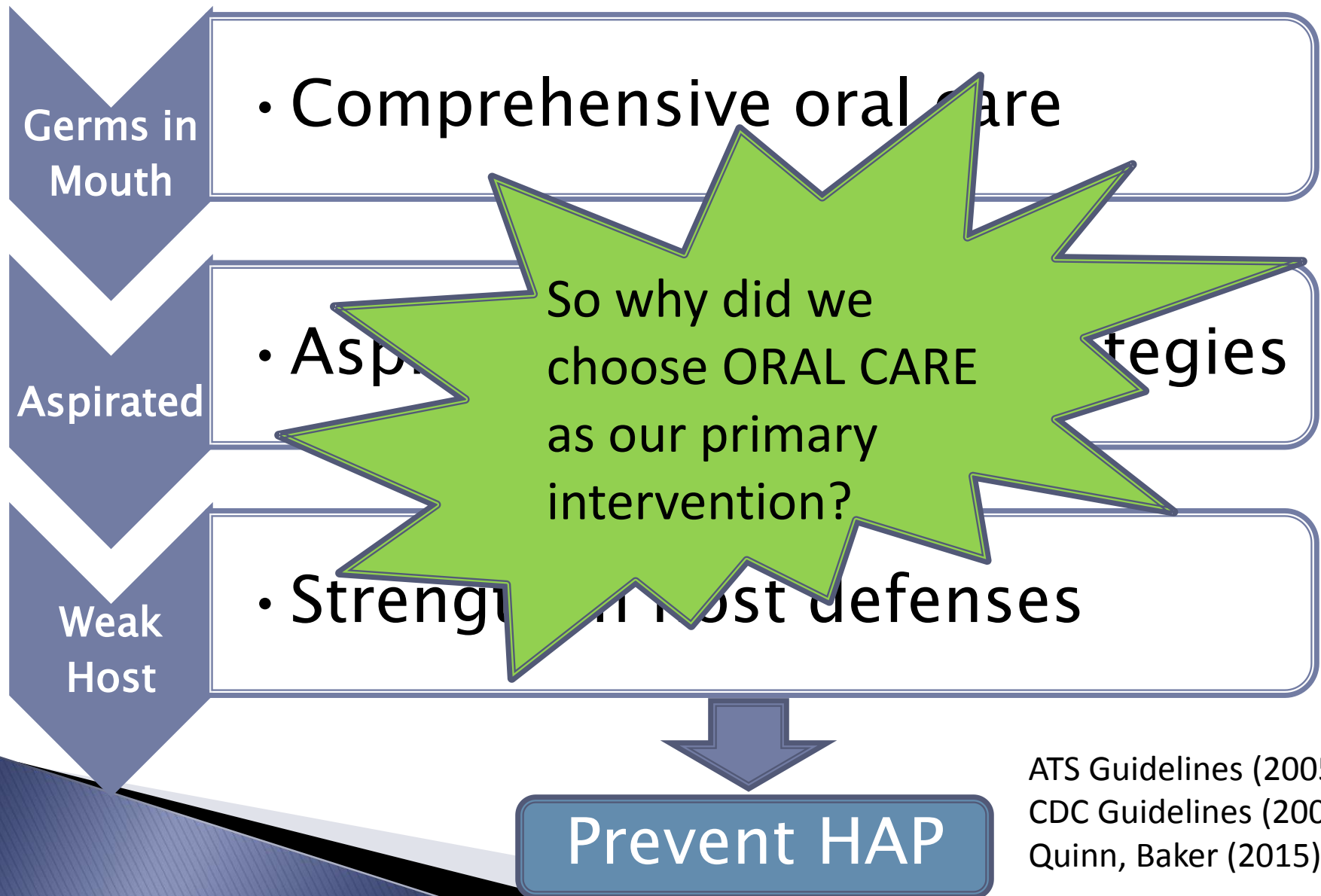


<http://archive.bio.ed.ac.uk/jdeacon/microbes/biofilm.htm>

Images supplied by: DG Allison & IW Sutherland

Loesche, W. 2012

# Prevention



ATS Guidelines (2005)  
CDC Guidelines (2003)  
Quinn, Baker (2015)



“Identify **modifiable risk factors** and develop programs to reduce the risk of pneumonia by changing those risk factors.”



Centers for Disease Control and Prevention  
CDC 24/7: Saving Lives, Protecting People™

# Care Bundles

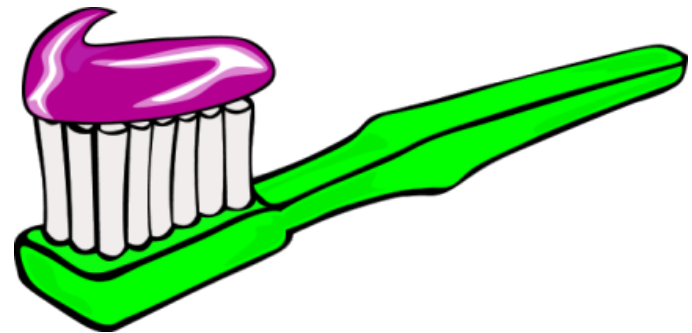


- ▶ BUNDLE = “a small set of evidence-based interventions for a defined patient population and care setting” (IHI, 2001)
- ▶ However, if the intervention needs to be applied to a diverse group of patients in different locations, it no longer meets the definition of a bundle--

**= Standard of Care**

# Literature Supports Oral Care to Prevent Pneumonia

- ▶ Guidelines: APIC, SHEA, CDC, ATS
- ▶ Included in ICU bundle to prevent VAP (IHI 2010)
- ▶ Cardiac Surgery
  - DeRiso (1996); Houston (2002)
- ▶ Esophageal Surgery
  - Akutsu (2010)
- ▶ Neuro
  - Robertson (2013)
- ▶ In Nursing Homes
  - Yoneyama (2002)
  - Watanabe (2004)



# Oral Care Reduces Pneumonia In Nursing Homes

## Method:

- ▶ 11 nursing homes in Japan over 2 year period
- ▶ 184 received oral care program/182 did not
- ▶ Tooth brushing after each meal (teeth or dentures) & 1x weekly review by dentist/or hygienist

## Results:

	No Oral	Oral Care	p value
Febrile	29%	15%	$p < .01$
Pneumonia	19%	11%	$p < .05$
Death	16%	7%	$p < .01$
MMSE		Increase	$p < .05$

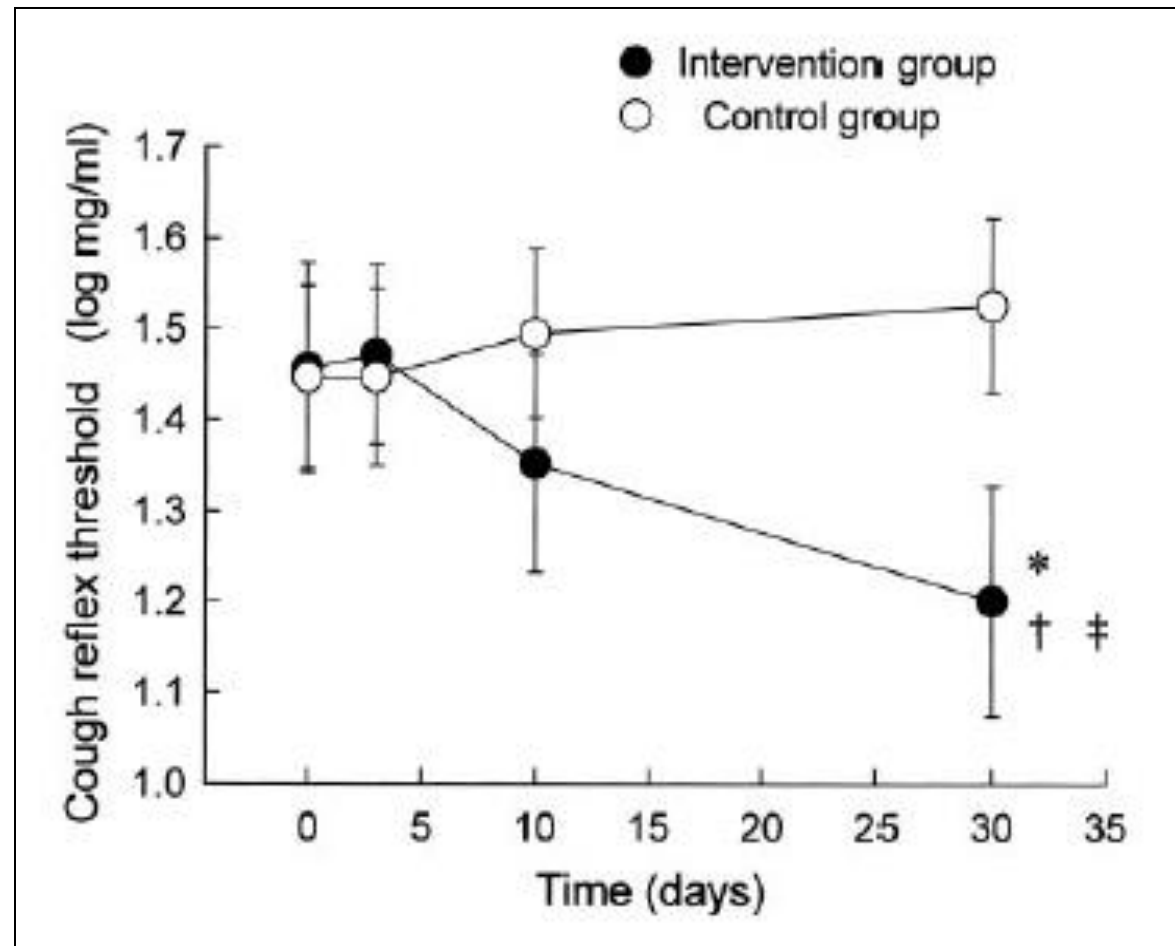
Yoneyama, et. Al.  
JAGS, (2002) 50:  
430-3

# Oral Care Reduces Pneumonia In Nursing Home Residents

- Improved swallowing and cough reflex sensitivities

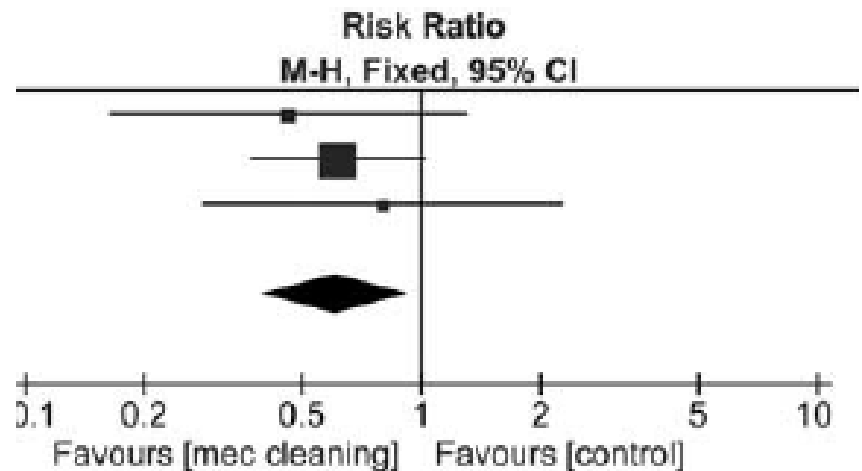


Watando A. et al. Chest, 2004; 126:1066–1070)



# Prevention of Healthcare-Associated Pneumonia with Oral Care in Individuals Without Mechanical Ventilation: A Systematic Review and Meta-Analysis of Randomized Controlled Trials

- 5 RCTs
- 1009 subjects
- Significant findings:
  - Risk reduction for pneumonia through oral care interventions
  - **Mechanical oral care risk reduction:**
    - pneumonia
    - fatal pneumonia





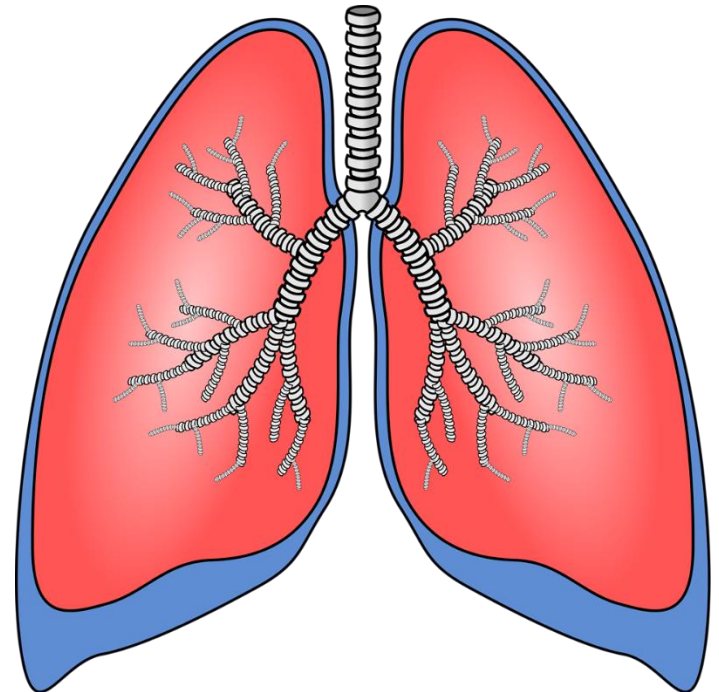
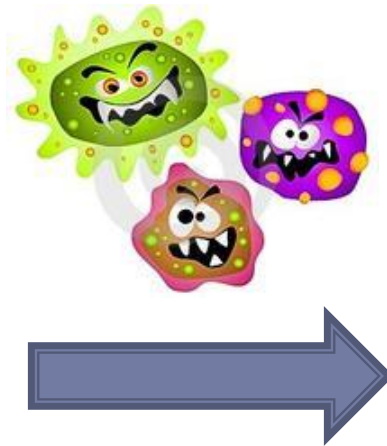
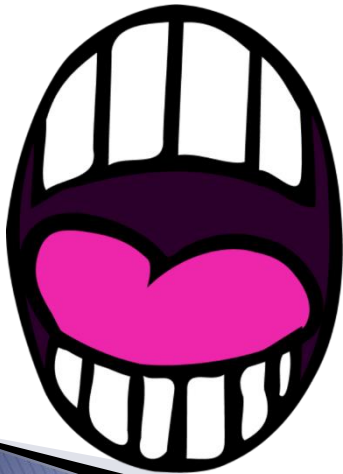


Nine out of ten dentists  
recommend brushing your teeth.

Study #2:  
Could we decrease  
NV-HAP by initiating  
a UNIVERSAL ORAL  
CARE PROGRAM for  
**ALL** patients?

# In general for the non-ventilated patient....

- ▶ Health professionals were not associating the potential for NV-HAP with the mouth –





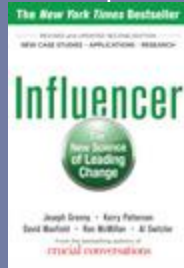
# Changing Behavior...



# Need a Good Plan to change systems and behavior

## Influencer Model

[www.Vitalsmarts.com](http://www.Vitalsmarts.com)



## *Motivation*

## *Ability*

### *Personal*

Patient stories  
“That was our patient”

Educate  
From “nice” to  
“necessary”

### *Social*

Compare units

Mentor peers

### *Structural*

Measurement  
Recognize  
staff

RIGHT Tools

# Interprofessional Collaboration

- ▶ TEAM WORK –
  - HAPPI Team + IP
- ▶ Academic–  
Community  
Partnerships
- ▶ Community  
partners –  
Sacramento Area  
Dental Society

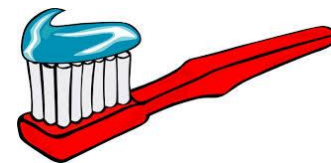


# Evidence-Based Interventions: Gap Analysis



Best Practice	Our Gaps	Action To Take
Comprehensive oral care for all (CDC, SHEA)	Only ICU vent patients had a standard	Develop inclusive oral care protocol for ALL patients
Oral CHG (0.12%) periop adult CV surgery and vent pts. (CDC, ATS, IHI)	Not using CHG on these patients	Added to preprinted orders, and to protocol
Therapeutic oral care tools (ADA)	Poor quality oral care tools  Absence of denture care supplies	New tools and supplies

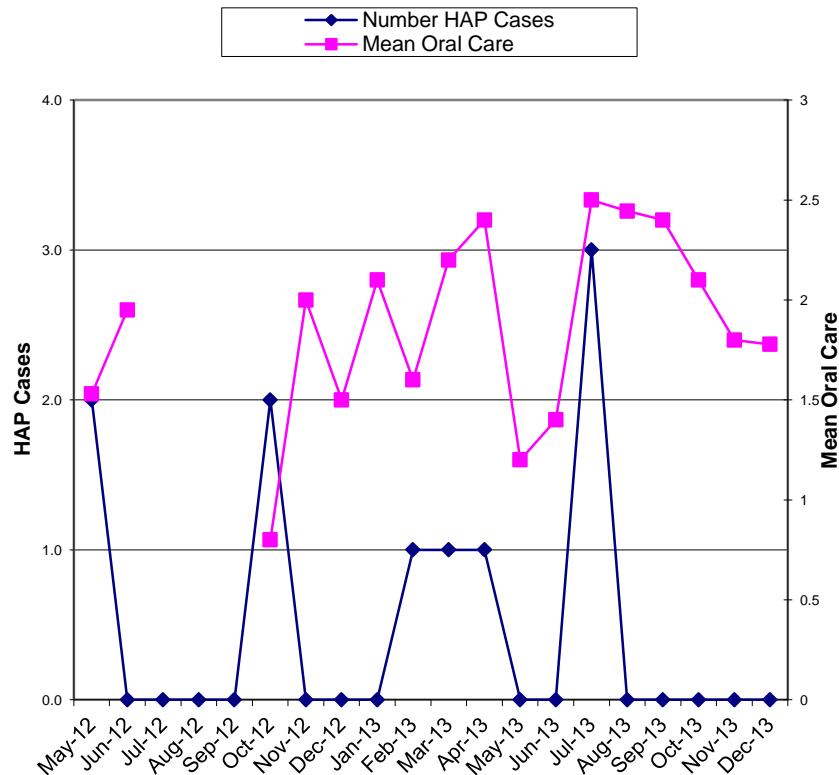
# Protocol – Short & Simple



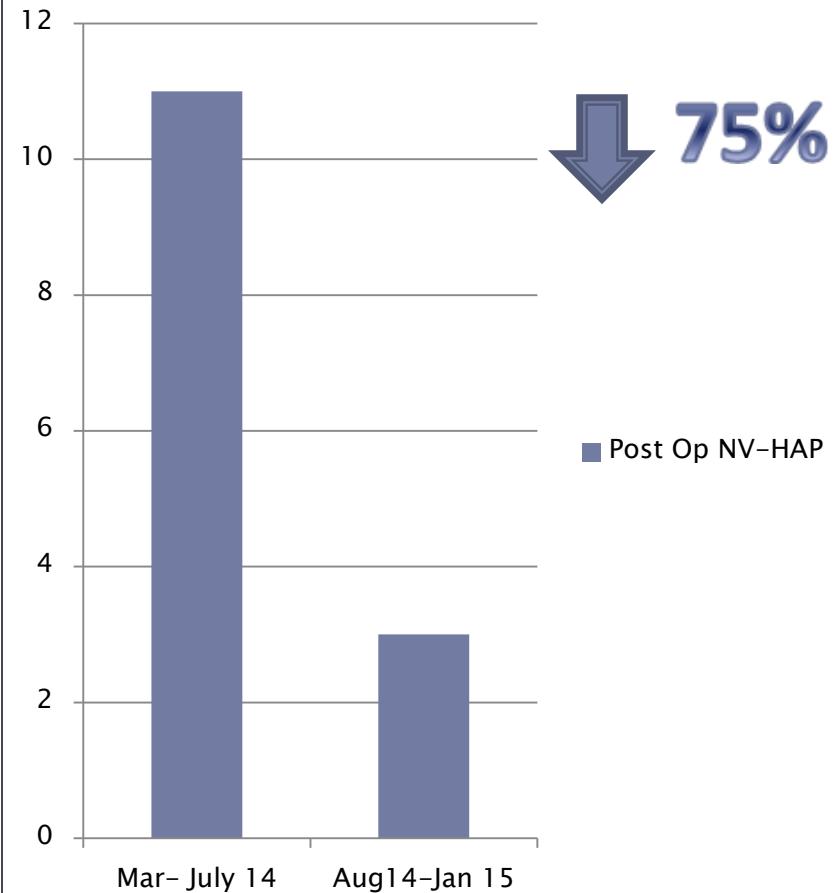
Patient Type	Tools	Procedure	Frequency
Self Care / Assist	Brush, paste, rinse, moisturizer	Provide tools Brush 1–2 minutes Rinse	4 X / day
Dependent / Aspiration Risk	Suction toothbrush kit (4)	Package instructions	4 X / day
Dependent / Vent	ICU Suction toothbrush kit (6)	Package instructions	6 X / day
Dentures	Tools + Cleanser Adhesive	Remove dentures & soak Brush gums, mouth Rinse	4X / day

# Meaningful Data Drives Improvement

SGH Ortho - Association of Mean Oral Care to HAP Frequency



Post Op NV-HAP





Great Job!



Recognize & Reward

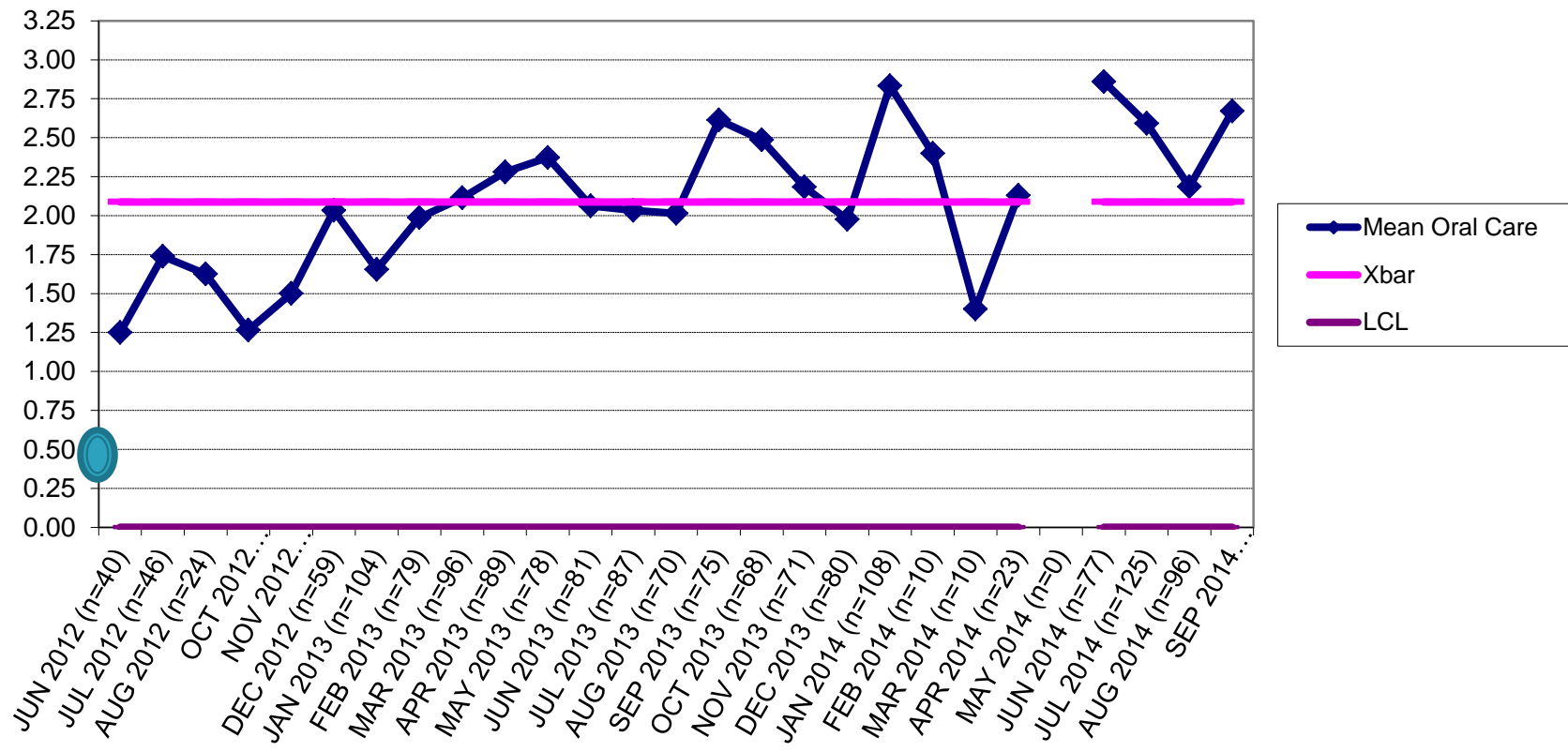






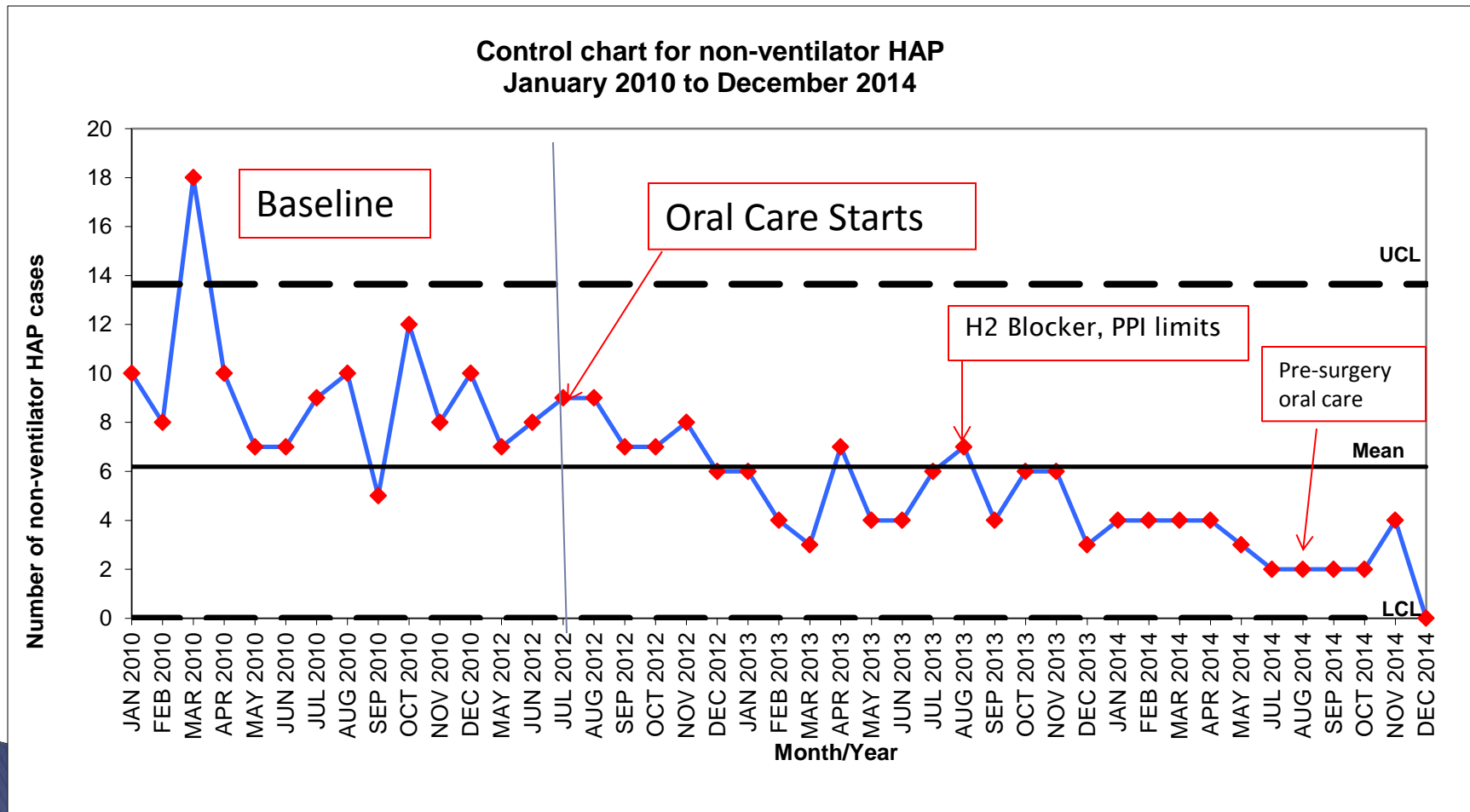
# Oral Care Frequency Per 24 Hours – All Units

X-bar chart mean oral care May, 2012 through September, 2014  
(excludes months with < 10 cases)



# NV-HAP Incidence 2014

## 70% Decrease from Baseline



# 2014 Results – 15 lives saved

- ▶ Patients in 2014 were 70% less likely to have non-ventilator pneumonia than patients in 2010 ( $p < .0001$ )
- ▶ 80 cases of NV-HAP avoided
  - \$3,200,000 cost avoided
  - 120,000 cost increase for supplies

**\$3,080,000** return on investment



*“APIC recognizes that these challenges will require the IP to be a new kind of leader—a collaborative leader who can engage people and groups to work toward common goals that eclipse their traditional roles, disciplines, and past experiences.”*

APIC Strategic Plan 2020



# Summary

- ▶ NV-HAP is a significant HAI, costing lives and dollars
- ▶ Basic oral care is a simple intervention targeting one of the most modifiable risk factors for HAP
- ▶ A team-based approach, **with IP leadership**, can result in improved patient care, outcomes, and reduction of HAI





“We are preventing  
pneumonia  
and saving lives,  
one clean mouth at a time.”

*(HAPPI Vision Statement, SMCS, 2012)*

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